

What is claimed is:

1. A method of producing particles comprising:  
providing:
  - a supercritical fluid;
  - a first solvent that is soluble in the supercritical fluid;
  - a second solvent that is substantially insoluble in the supercritical fluid and is at least partially soluble in or miscible with the first solvent; and
  - a solute that is soluble in the first solvent and is substantially insoluble in the second solvent and the supercritical fluid;contacting the first solvent, the second solvent and the solute together to form a solution; and  
contacting the solution with the supercritical fluid to extract the first solvent from the solution and precipitate the solute in the form of particles that are suspended in the second solvent.
2. The method according to claim 1 wherein the solute comprises a biologically active substance.
3. The method according to claim 1 wherein the supercritical fluid is selected from the group consisting of supercritical carbon dioxide, dimethylether, straight chain or branched chain C1-C6 alkanes and combinations thereof.
4. The method according to claim 1 wherein the solution further comprises a plurality of solutes and wherein the particles suspended in the second solvent comprise the plurality of solutes.
5. The method according to claim 4 wherein the plurality of solutes comprises a first solute comprising a biologically active substance and a second solute comprising an excipient selected from the group consisting of a polymer, a wax, a lipid and combinations thereof.

6. The method according to claim 1 wherein the first solvent comprises an organic solvent.

7. The method according to claim 6 wherein the first solvent is selected from the group consisting of dimethyl formamide, dimethyl sulfoxide, alcohols, acetone, ethyl acetate and chloroform.

8. The method according to claim 1 wherein the second solvent is water.

9. The method according to claim 1 wherein the average particle size of the particles suspended in the second solvent is from about 10 nm to about 10 µm.

10. Particles formed according to the method of claim 1.

11. A method of producing particles comprising:

providing:

supercritical carbon dioxide;

an organic solvent that is substantially soluble in supercritical carbon dioxide;

water; and

a biologically active substance that is soluble in the organic solvent and is substantially insoluble in water and supercritical carbon dioxide;

contacting the organic solvent, water and biologically active substance together to form a solution; and

contacting the solution with the supercritical carbon dioxide to extract the organic solvent from the solution and precipitate the biologically active substance in the form of particles that are suspended in water.

12. The method according to claim 11 wherein the solution further comprises a second solute comprising an excipient selected from the group consisting of polymers,

waxes, lipids and combinations thereof, and the particles suspended in water comprise the biologically active substance and the excipient.

13. The method according to claim 11 wherein the organic solvent is selected from the group consisting of dimethyl formamide, dimethyl sulfoxide, alcohols, acetone, ethyl acetate and chloroform.

14. The method according to claim 11 wherein the average particle size of the particles suspended in water is from about 10 nm to about 10 µm.

15. Particles formed according to the method of claim 11.

16. An apparatus for producing particles comprising:  
an extraction vessel;  
a first reservoir for holding a supply of supercritical fluid;  
a first pump for pumping supercritical fluid from the first reservoir to the extraction vessel;  
a second reservoir for holding a supply of solution, the solution comprising:  
a first solvent that is soluble in the supercritical fluid;  
a second solvent that is substantially insoluble in the supercritical fluid and is at least partially soluble in or miscible with the first solvent; and  
a solute that is soluble in the first solvent and is substantially insoluble in the second solvent and the supercritical fluid;  
a second pump for pumping solution from the second reservoir to the extraction vessel;  
a release valve for removing a mixture comprising supercritical fluid and the first solvent from the extraction vessel; and  
means for removing particles of the solute suspended in the second solvent from the extraction vessel.